

ENGINE 125 CBD AC

Engine service manual



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Introduction

I.1 ENQUIRY NOTES

The intervention in control, maintenance, repairs, replacement parts, etc. in the whole range of our motor vehicle, means not only the competence and experience of the responsible technicians in this task, in the modern technologies, but also the knowledge of the quick and rational procedures, of the technical characteristics, of the calibrated values, of the torque, that only manufacturer is in a condition to lay down for certain.

The present series of WORKSHOP GUIDES for four-stroke engine, provide the main information for the technicians of the sector (Authorized Dealer, etc...) to operate harmoniously on the modern concepts of "good technique" and "safety at work".

The aim of these guides, is about the standard technical interventions in the whole range of engine (two-stroke engine) for RIEJU motor vehicles in the production phase at the spreading time of these manuals. This information refers to the "ENGINES" of the motor vehicles. Some information has been deliberately omitted, since (according to us) it is an essential part of the basic technical knowledge.

Another possible information, can be deduced from the SPARE PARTS CATALOGUES (of each particular model).

Before reading the motor vehicle manual you are interested in, it is important that you examine the first general pages, where you will find the basic information for a good item enquiry and the general nature technical concepts.

REMARK:

The manual provides you with the essential information for the standard intervention procedures. This information is supplied by the engine manufacturers, so therefore, this frees us to be responsible for any eventual error, omissions, etc.

The RIEJU company reserves the right to contribute modifications at any time, without any previous notice.

For any request or further information please call to Rieju Technical Assistance Service.

I.2 UPDATING GUIDE

- **The updating** will be send (in a reasonable period). Each new document will replace the one you have already got.
- **The index** will be updated in case modifications and changes of the pages inside no longer guarantee a rational enquiry of the manual.
- **IMPORTANT!** The series of Workshop Guides has to be considered as a **work tool**, strictly speaking, and it can remain in "value" through time, only if it is constantly updating.

1.3 WRITING SIMBOLOGY



ATTENTION! Some caution advice and information as regards to the safety of the motorcyclist (vehicle user) and the safeguard of the whole vehicle.



ATTENTION! Descriptions relating to some dangerous interventions for the maintenance engineer, the repair technician, the workshop staff or strangers, for the atmosphere, for the vehicle and for the equipments.



FIRE RISK

Operations which could cause fire.



DANGER OF EXPLOSION

Operations which could cause explosion.



TOXIC

Evident danger of poisoning or inflammation of the first respiratory track.



MECHANICAL MAINTENANCE

Operations to be performed only by an expert mechanic.



ELECTRICAL MAINTENANCE

Operations be performed only by an expert electrical / electronic technician.



NO!

Operations which must be avoided.



ENGINE WOKSHOP GUIDE

Information derived from this documentation.



SPARE PARTS CATALOGUES

Information derived from this documentation.



F	Figure
Pr Tr	Torque
P	Page
Ap	Sub-section
S	Section
Es	Diagram
T	Table
Tr	Bolt

Remark:

*Illustrations frequently shown fixing or regulator screws, specified with the letter **Tr**. The **number** besides this letter indicates the quantity of identical **Tr** existing in the group or object component of the description and its corresponding illustration. The letter **without number**, indicates **quantity 1**. In case of different screws shown in the same figure, a **number** and a **small letter** will follow the letter **Tr** (example: (Tr4a)).*

*The re-assembly of groups and components is usually carried out in **opposite way** to the disassembly interventions (excepting specified description).*

I.4 OPERATIVE SIMBOLOGY**L)** Loctite**O)** Lubrication (oil)**G)** Greasing (grease)

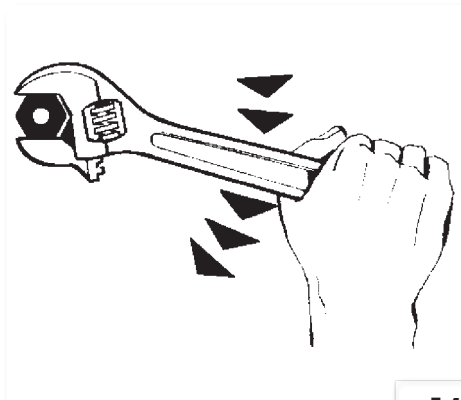


1.5 WORK GENERAL RULES

- **The following advice, recommendations, and warnings,** guarantee rational interventions in the maximum operative safety, ruling out considerably the probabilities of accidents, all kind of damage and time-out. Therefore, we advise you to observe them scrupulously.

ADVICE:

- Always use high quality equipments.
- For raising the motor vehicle, use manufactured equipment on purpose and subject the European regulations.
- During the operations, tools must be within arm's reach, as far as possible, according to a predetermined sequence, and anyway, never on the vehicle or in a hiding or inaccessible place.
- Keep your workplace duly clean and tidy.
- To tighten bolts and nuts, begin with those of **bigger diameter** or the interior ones, proceeding in "**cross**" in one go and so on.
- The most proper use of the spanner (the fork one), is **in one go** never pushing.
- The rolling monkey wrench (F-1) have to be used in emergency conditions, this is to say, when the suitable size tool is not available. During the effort, the mobile clamp tend to open and this could damage the bolt as well as lead to obtain a torsion moment of an unreliable tightness. Anyway, use tools like the illustration (figure 1).
- Excluding some exceptional assistance cases, prepare a **record card** for the Customers, where all the interventions done and notes for possible controls in future will be entered.

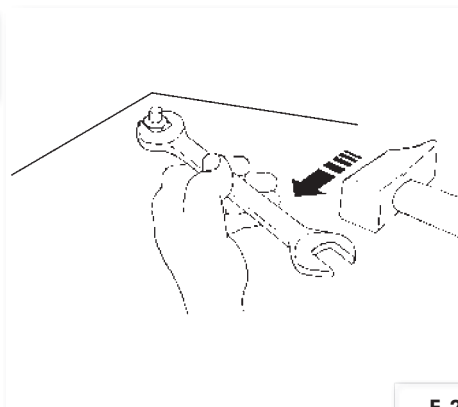


F-1

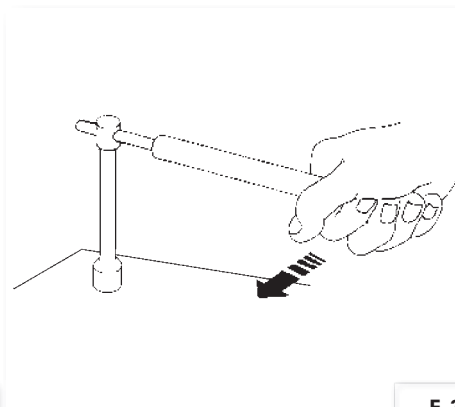


1.6 RECOMMENDATIONS

- **Before beginning** any intervention in the motor vehicle, wait till all and each one of the components of the same vehicle are **completely cool down**.
- If the operations need two technicians work, it is necessary that they previously come to an agreement on tasks and synergies.
- Always check the correct assembly of each component, before assemble another one.
- Lubricate the need spare parts, before re-assembly.
- The linings, the watertight and elastic rings and the pins must be replaced when disassembly takes place.
- The torque values indicated in the manuals, refer to the “**final tight**”, and they have to be progressively reached, in consecutive goes.
- The loosen and tighten operations of the parts in aluminium alloy (sump) must be carried out when the **motor cools down**.
- Always use screwdrivers of suitable size for the bolts in use.
- **Never work in awkward conditions neither in an unstable situation of the motor vehicle.**
- **Never use a lining or an elastic ring again.**
- **Never unscrew or screw down bolts and nuts with clips since, besides it does not exert enough blockade force, the bolt cap or the nut hexagon can be damaged.**
- **Do not hit with the hammer (or another tool) on the spanner to loosen or tighten bolts and nuts (F-2).**
- **Do not use the extension bar for the spanner (F-3).**



F-2



F-3



Never use, under no circumstances, free flames.

Never leave open and not suitable containers with fuel, blocking the pass, near to heat sources, etc.



Never use fuel like a cleansing detergent for the motor vehicle or for the workshop floor. The components must be cleaned with a low grade of inflammability detergent.



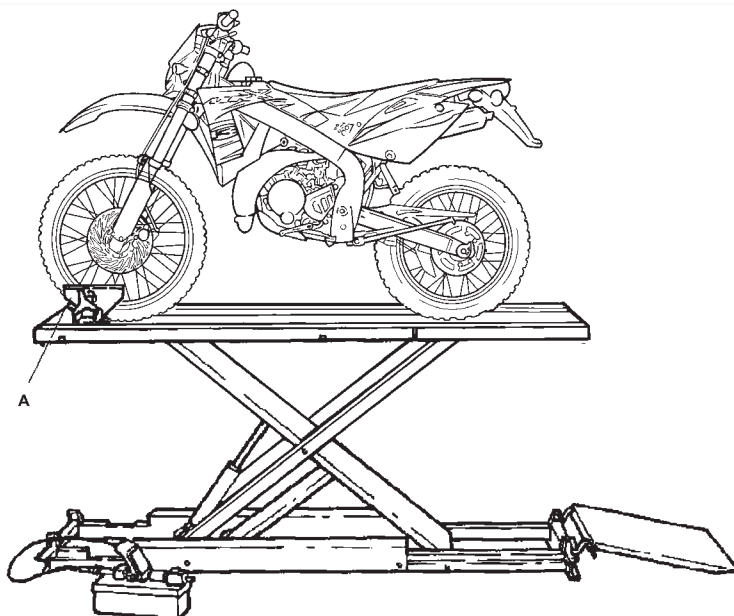
Never suck in or blow in the fuel pipe.

Never carry out welds in the presence of fuel. Remove the tank although it is totally empty and disconnected the negative (-) lead of the battery.

Never leave the motor running in closed premises or without air vent.



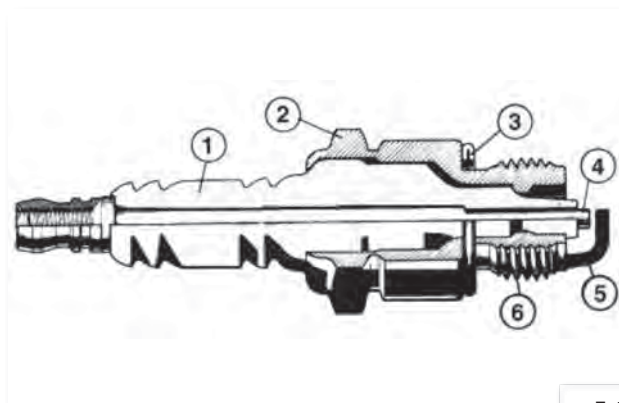
Before each intervention, make sure of the motor vehicle is perfectly steady. The front wheel should be anchored, preferably, to the integrated tool (A/F-4) in the running board.



F-4



I.7 SPARK PLUGS

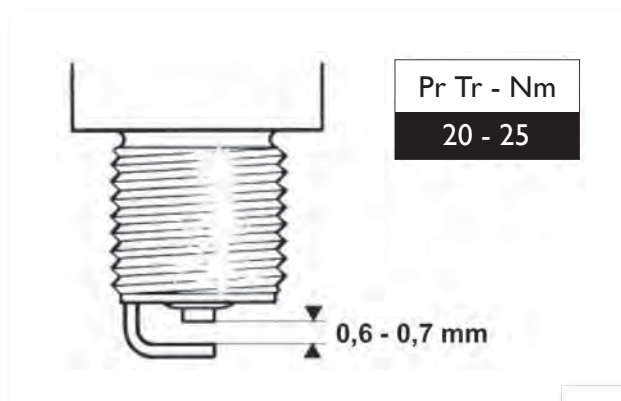


- 1. Insulator
- 2. Body
- 3. Lining
- 4. Electrode
- 5. Earth electrode
- 6. Thread

F-5

SPARK PLUGS CONTROL AT 1.000 Km

- Do not touch the spark plug if the **motor is hot**.
- The coal tip and the insulator coloration (around the central electrode) provide with useful information about the **thermic degree** of the spark plug, the **carburation**, the **lubrication** and the overall condition of the engine.
- A **light brown** (insulator) coloration indicates the correct general operation.
- Black sooty tips, dry (to the touch), opaque, indicate that the operation temperature is too low (spark plug thermic degree is too high), too rich carburation or faulty ignition.
- Off-white insulator indicates: a mixture too weak or spark plug thermic degree too low (spark plug too hot).
- Verify the distance between the electrodes (F.6) (although the spark plug is new) using a calibrated calibre of thickness, and eventually, register it working only on the earth electrode.



F-6

1.8 SPARK PLUG MAINTENANCE



- The spark plug maintenance consists in removing it periodically from the motor to check (visually) the conditions and the distance between the electrodes.
- Proceed to clean the electrodes and the insulator carefully, using a wire brush.
- Eliminate possible waste with a strong jet of compressed air.
- Lubricate the thread of the spark plug with motor oil or grease, that conducts electricity, then screw it by hand until the bottom.
Then press it moderately with the respective spanner (see torque in F.6).



It is necessary to replace all spark plug with fissures in the insulator or corroded electrodes.

1.9 SPARK PLUG REPLACEMENT AT 5000 Km

- At the foreseen kilometres, replace always the spark plug with a new one, choosing one of those that the Company RIEJU, S.A. recommends.
- When the discharged spark plug is being eliminated, inspect always its general look (as previously stated) to check the good state of the engine.

1.10 MOTOR REMOVAL

- To remove the motor from the frame, look up in the Workshop Guide, in “Cyclist” section, where you will find all the steps to follow.

1.11 MOTOR DISASSEMBLY

The manufacturer is exempt from any responsibility caused by damages of any nature in a disassembly and a new assembly of the engine and each of its parts, owing to the use of unsuitable tools for this kind of interventions.

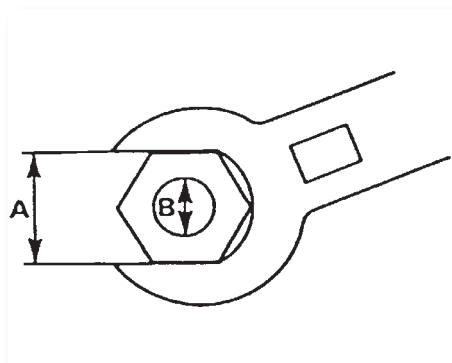


Exclusively use **ORIGINAL RIEJU SPARE PARTS**.



2.1 TORQUE GENERAL SPECIFICATIONS

- The following table specifies the fixed torques with ISO standard thread. The torque specifications for components or special units are indicated in the chapters of this guide referring to ISO. To avoid strains, screw the units gradually and cross them in one or alternative goes, to obtain the specified torque..

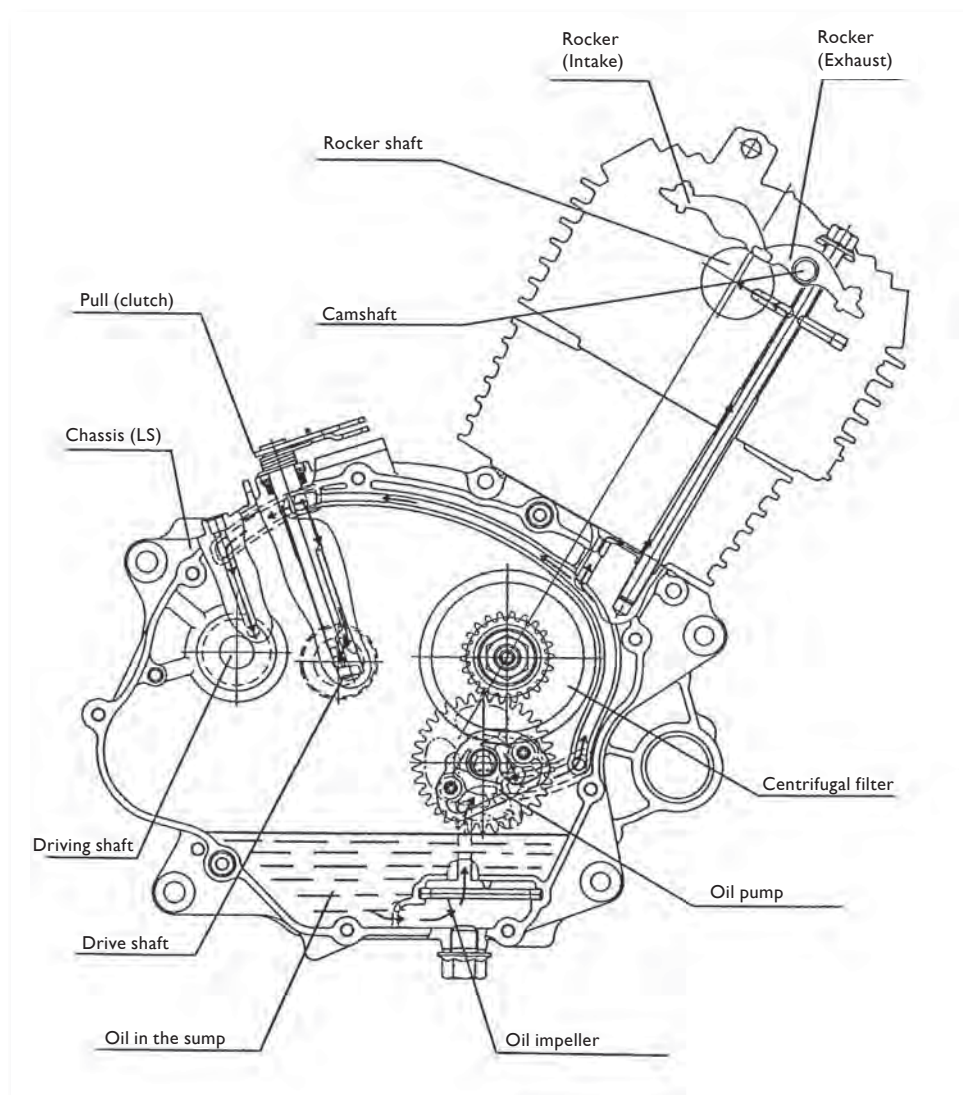


A= Distances among the planes.

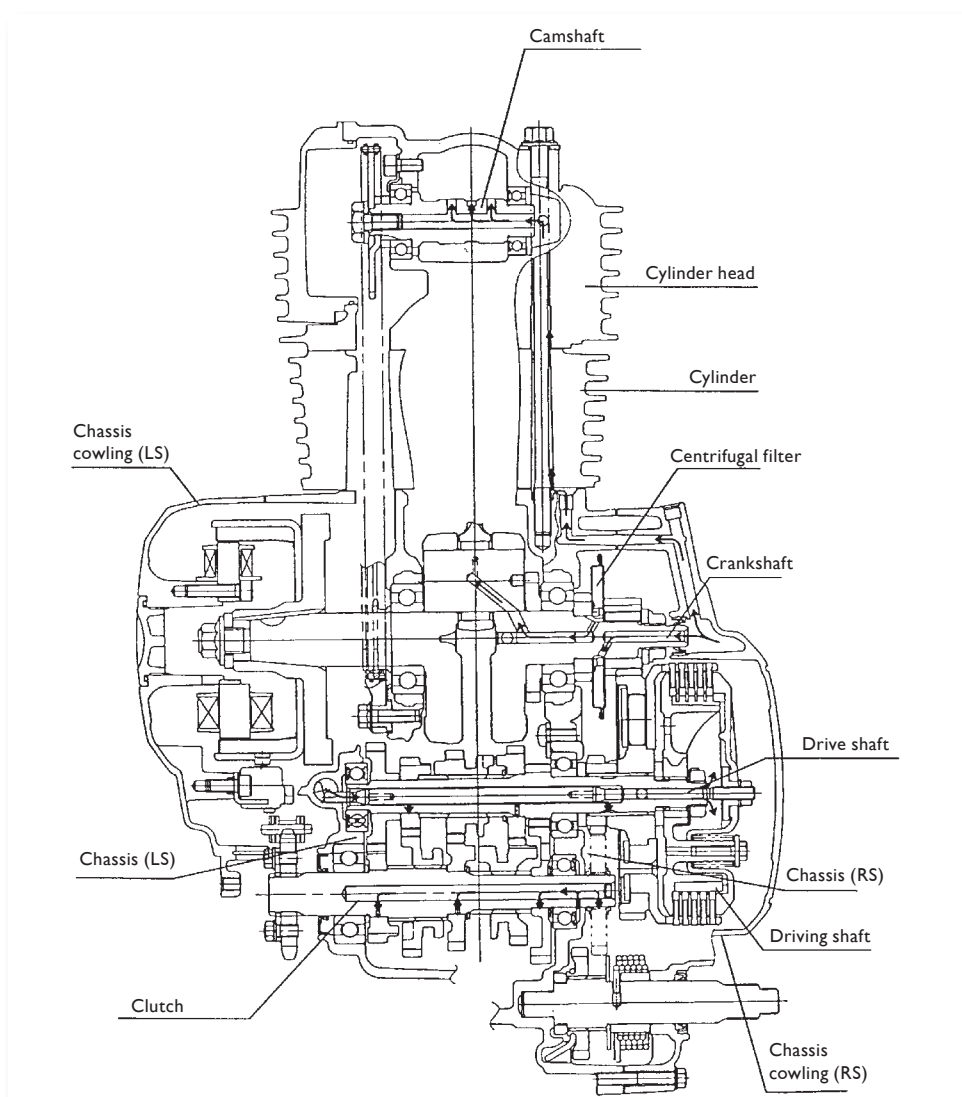
B= External Diameter of the thread.

A (Nut)	B (Nut)	Torque general specifications		
		N.m	Kgf.m	ft.lb
10mm	6mm	6	0,6	4,3
12mm	8mm	15	1,5	11
14mm	10mm	30	3,0	22
17mm	12mm	55	5,5	40
19mm	14mm	85	8,5	61
22mm	16mm	130	13,0	94

2.2 LUBRICATION DIAGRAM



Don't damage the chassis surface, otherwise there will be oil leaks.



For a better performance, use always oil and "amalibe".

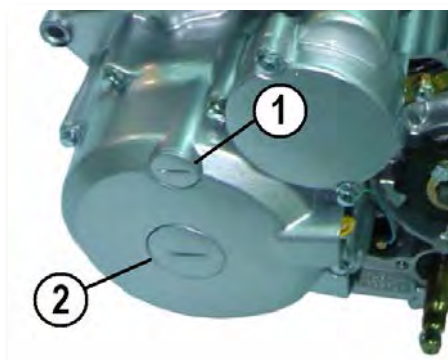
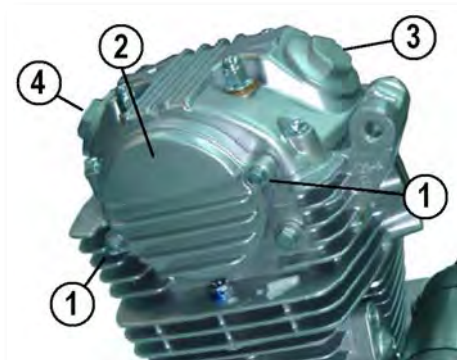


2.3 VALVES SET ADJUSTMENT

Remark:

The valves set should be adjust when the motor is cool down and at room temperature.

When adjusting or measuring the valves set, the piston should be in the top dead centre (TDC) at the compression moment.

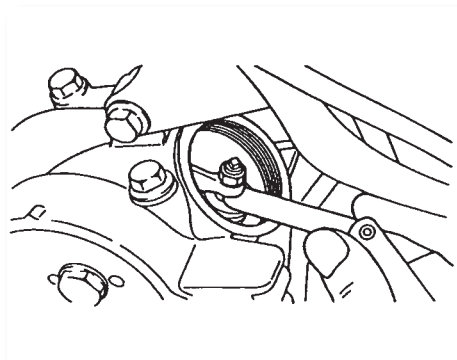


1) REMOVE:

- Spark plug
- Screws (1).
- Lateral cover of the cylinder head (2).
- Valves lining (intake) (3).
- Valves lining (exhaust) (4).

2) REMOVE:

- Top of the point control (with the gasket) (1).
- Central cap (with the gasket) (2)



3) MEASURE:

- Set of valves.

Unspecified => **Adjustment**



Set of valves (cold):

Intake:

0,08 ~ 0,12 mm

Exhaust:

0,08 ~ 0,12 mm

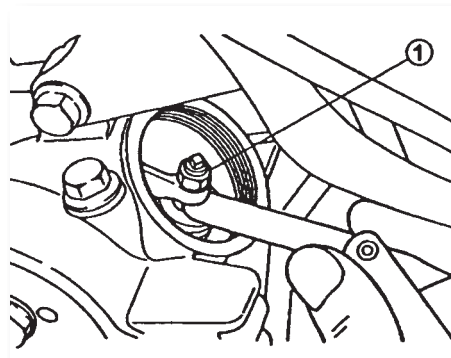
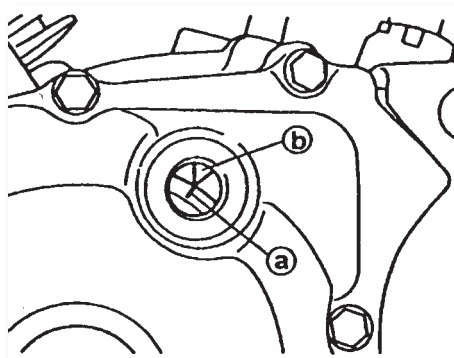


Steps for measuring:

- Rotate the crankshaft anticlockwise aligning the mark (a) of the rotor with the stationary point (b) of the chassis cover (I), with the piston in the top dead centre (TDC), and when the mark of the control gear is aligned with the mark of the cylinder head.

- Measure the set of valves with a calibre of thickness.

Unspecified => **Set adjustment**



4) ADJUST:

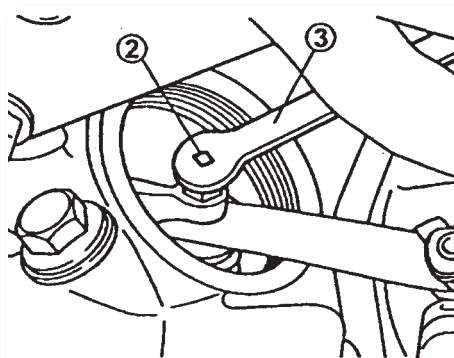
- Set of valves.

Steps for measuring:

- Loosen the locknut (1).
- Rotate the adjuster (2) towards the inside or outside with the fixed adjustable spanner (3) to obtain the specified play.

Turn towards the inside: Play diminishes

Turn towards the outside: Play increases



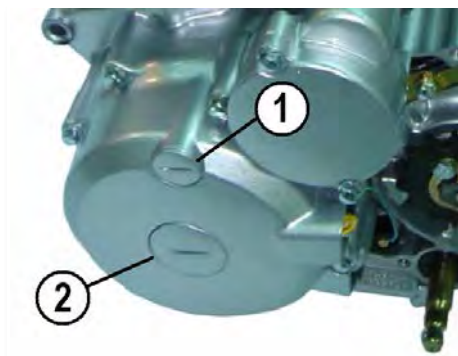
- Install the adjuster to impede it turns and tighten the locknut.



Locknut:

1,4 Kgf.m (14 N.m).

- Measure the set of valves.
- If the play is incorrect, repeat the aforementioned steps until the correct play is achieved.



5) INSTALL:

- Top of the point control (with the gasket) (1).
- Central cap (with the gasket) (2).

SPARK PLUG CONTROL

1) REMOVE:

- Spark plug connector.
- Spark plug.



Before removing the spark plug, blow on the area with compressed air to eliminate any piece of dirt, in order to avoid it falls inside the engine.

2) CHECK:

- Spark plug Type.



Incorrect => **Replace.**

Standard spark plug:

DR8EA (NGK)

Checks and adjustments

Engine



3) CHECK:

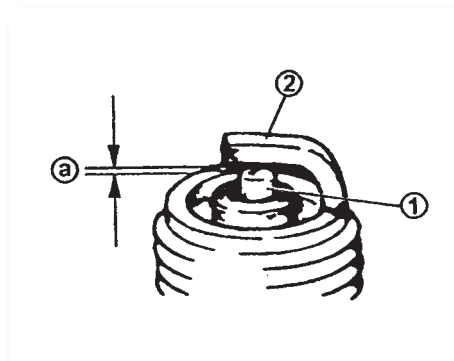
- Electrodes (1).

Damages/Wear => **Replacement.**

- Insulator (2).

Standard colour => **Replacement.**

The standard colour is light brown.



4) CLEAN:

- Spark plug.

(Clean the spark plug with a spark plug cleansing or a wire brush).

5) MEASURE:

- Play between the electrodes (a)
(with a calibre of thickness).

Unspecified => **Adjustment to play.**



Play between the electrodes:

0,7 mm

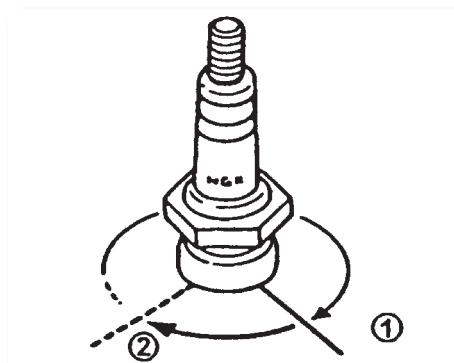
6) INSTALL:

- Spark plug.



Spark plug:

1,8 Kgf.m (18 N.m)





Remark:

- Before installing the spark plug, clean the surface of its seating and its gasket.
- In case you do not have a torque gauge, a good evaluation for the correct torque is to tighten (1) the spark plug by hand and then tighten from 1/4 to 1/2 turn to (2).
- Use always a new gasket.

2.4 IGNITION POINT CONTROL

Remark:

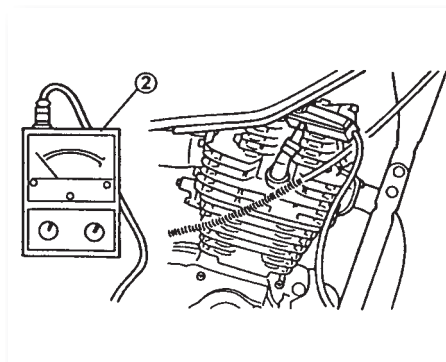
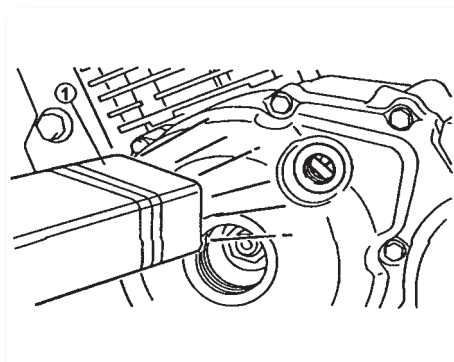
- Before controlling the ignition point, check all the electric connections linked into the ignition system. Make sure that the connections are tightly and without rusty and also the earth connections must be very tight.

1) REMOVE:

- Top of the point control

2) INSTALL:

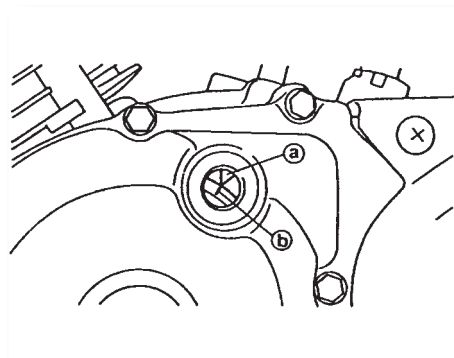
- Stroboscope lamp (1).
- Inductive Tachometer (2) (in the spark plug cable).





3) CHECK:

- Ignition Point.



Steps for checking:

- Get the engine started and let it warming up for some minutes. Leave it working in the specified rotation.



Idling speed:

1.300 - 1.400 rpm

- Check visually if the stationary point (a) is inside the band (b) in the magneto flywheel.

Outside the band => **Check the ignition system.**

Remark:

- The ignition point is not adjustable.

4) INSTALL:

- Top of the point control (with the gasket).

2.5 COMPRESSION PRESSURE ADJUSTMENT

Remark:

- Insufficient compression pressure results in loss of power.

1)CHECK:

- Set of valves

Unspecified => **Adjust.**

See section **"VALVES SET ADJUSTMENT"**.

- 2) Get the engine started and let it warming up for some minutes.

- 3) Pull the engine up.

Checks and adjustments

Engine



4) REMOVE

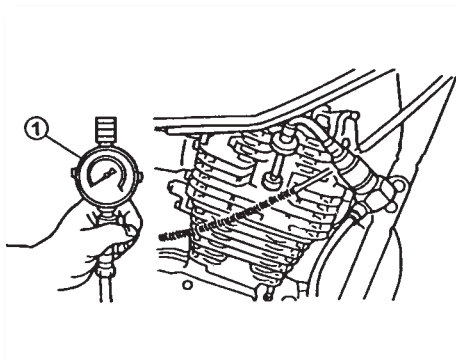
- Spark plug.



Before removing the spark plug, blow on the area with compressed air to eliminate any piece of dirt, in order to avoid it falls inside the engine.

5) INSTALL:

- Compressor gauge (I).



6) MEASURE:

- Compression Pressure

If it exceeds the permitted maximum pressure $= >$ **the cylinder head, the valves surface and the piston head in relation to carbon.**

If it is under the minimum pressure $=>$ **Inject some drops of oil into the cylinder and measure again.**

Follow the table below:

COMPRESSION PRESSURE (With oil injected into the cylinder)	
Higher measure than without oil	Worn or damaged piston
The same measure as without oil	Possible defect in rings, valves, cylinder head gasket or piston $=>$ REPAIR

Compression pressure (at the sea level):

Standard:

1.200 KPa (12 Kg/cm²)

Minimum:

1.000 KPa (10 Kg/cm²)



**Steps for measuring:**

- Get the engine started with the throttle totally opened, until the compression reading becomes stabilized.



Before getting the engine up, connect the cable from the spark plug to earth to avoid sparks.

**7) INSTALL:**

- Spark plug.

2.6 CHECKING OF THE MOTOR OIL LEVEL

- 1) Place the motorcycle in a flat surface.

Remark:

- Make sure that the motorcycle is in vertical line when checking the oil level.

- 2) Get the engine started and let it warming up for some minutes.

- 3) Pull the engine up.

- 4) Move the oil level dipstick (1). Clean it with a cloth and place it in the orifice of oil supply without threading it. Immediately, move it again.

5) CHECK:

- Level of motor oil.

The level of oil should be between the maximum (1) and minimum (2) marks.

Oil underneath the minimum level => **Add oil up to the appropriate level.**

**2.7 RECOMMENDED MOTOR OIL****Recommended motor oil:**

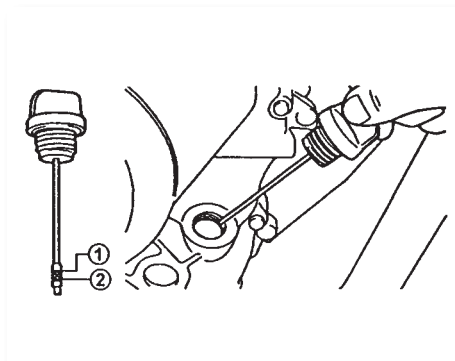
SAE 20-40 or similar.

6) Get the engine started and let it warming up for some minutes.

7) Pull the engine up.

Remark:

Wait some minutes till the oil goes down, before checking the oil level.



2.8 MOTOR OIL CHANGE

1) Get the engine started and let it warming up for some minutes.

2) Pull the engine up and place a tray under the motor.

3) REMOVE:

- Oil level dipstick.
- Drainage cap (1).
- Gasket.

Drain the oil in the sump.

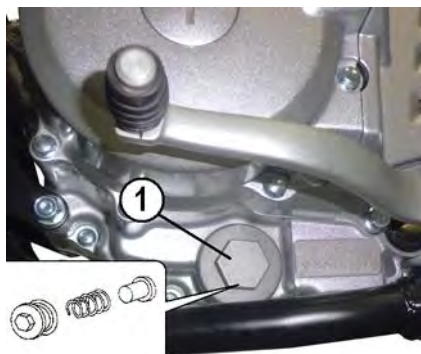
4) INSTALL:

- Drainage cap (1).
- Oil level dipstick.



Drainage cap:

1,5 Kgf.m (15 N.m)



Checks and adjustments

Engine



5) SUPPLY:

- Oil in the sump.



Quantity of oil:

1,0 L

6) CHECK:

- Level of motor oil.

See section “CHECKING THE LEVEL OF MOTOR OIL” “OIL FLOW CHECKING”.



2.10 EXHAUST SYSTEM CHECKING

1) CHECK:

- Screws (1) (exhaust pipe).

Loose / damages = > **Tighten / replace.**

- Gasket (exhaust pipe).

Leak of exhaust fumes = > **Tighten / replace.**

Screw:

0,9 Kgf.m (9N.m)

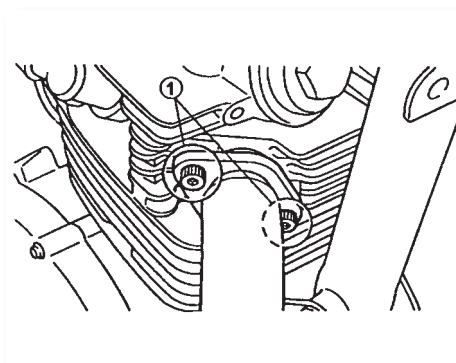
2) CHECK:

- Screws (2).

Loose / damages = > **Tighten / replace.**

Screw:

0,9 Kgf.m (9 N.m)



Engine R1EJU



3.1 MOTOR DISASSEMBLY

CYLINDER HEAD, CYLINDER AND PISTON

REMARK:

With the assembled motor in the frame, the cylinder head, camshaft and cylinder can be checked, replace the following parts:

- Seat
- Side cowling
- Fuel tank
- Exhaust pipe
- Carburettor
- Clutch cable
- Spark plug Cable
- Securing base of the engine

1) REMOVE:

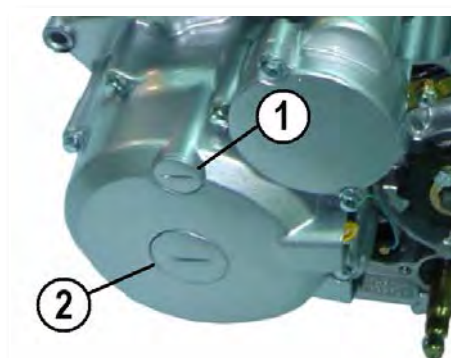
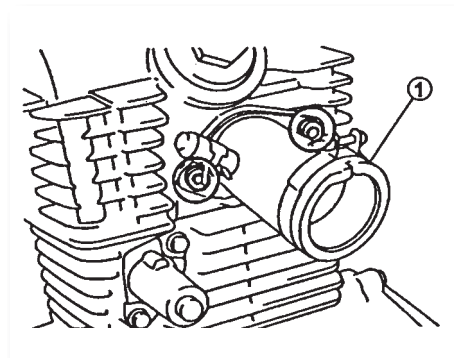
- Spark plug.
- Inlet manifold (1).

2) REMOVE:

- Top of the point control (with the gasket) (1).
- Central cap (with the gasket).

3) REMOVE:

- Valves lining (with the gasket).
- Side covers of the cylinder head (with the gasket).





4) ALIGN:

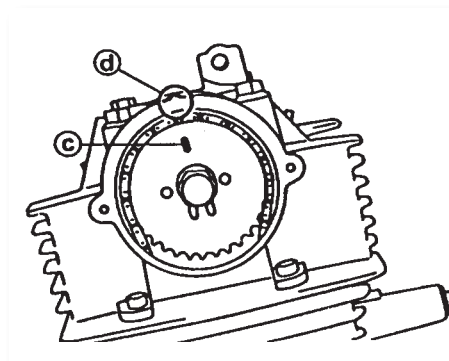
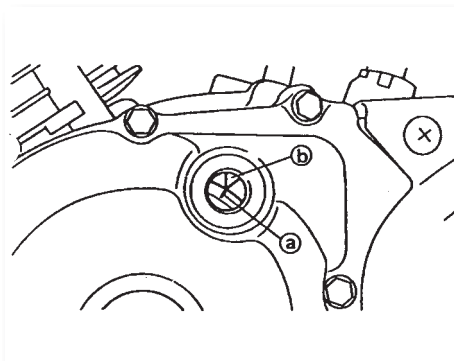
- Magneto mark (a) (with the stationery point (b) of the chassis cowlng).

Remark:

Rotate the crankshaft anticlockwise with a spanner.

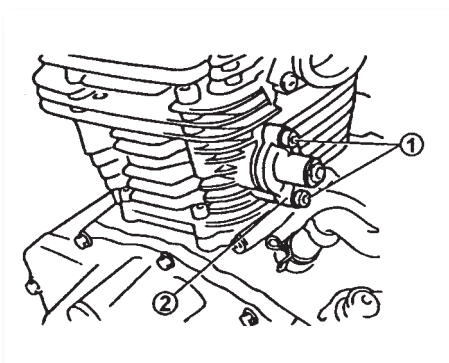
Steps for alignment with TDC:

- Rotate the crankshaft anticlockwise aligning the mark (a) with the top dead centre (TDC) (b).
- Align the mark I (c) of the control gear with the stationary point (d) of the cylinder head. So, the piston will remain in top dead centre (TDC).



Remark:

- Check if the piston is in the TDC of the compression time.
- If it is not, rotate the crankshaft anticlockwise completely once again.



5) REMOVE:

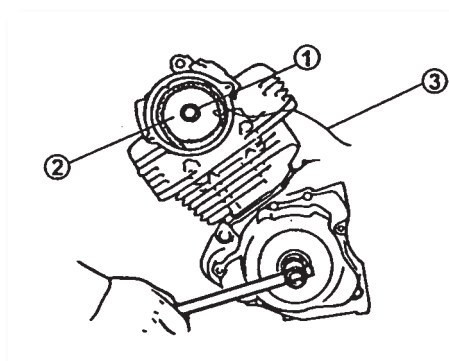
- Screw (starter motor) (1).
- Starter motor.

6) REMOVE:

- Screw (adjuster of the timing chain) (1).
- Adjuster unit of the timing chain (2).

7) REMOVE:

- Screw (control gear) (1).
- Particular washer (control gear) (2).





8) REMOVE:

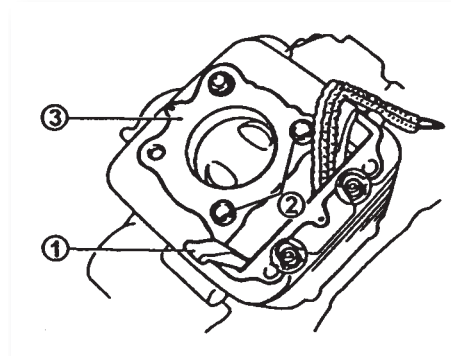
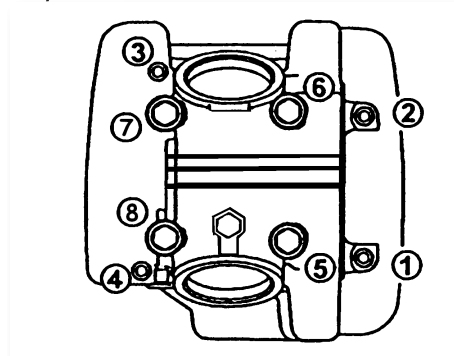
- Screws (cylinder head).
- Cylinder head.

Remark:

- Loosen each one of the screws 1/4 turn and remove them when they are completely loose.
- Loosen the screws, beginning with the smaller number.
- The stamped numbers on the cylinder head indicated the torque sequence.

9) REMOVE:

- Guide of the timing chain (exhaust) (1).
- Tangs guide (2).
- Gasket (cylinder head) (3).
- Screws (cylinder head).
- Clutch cable hold.
- Cylinder.

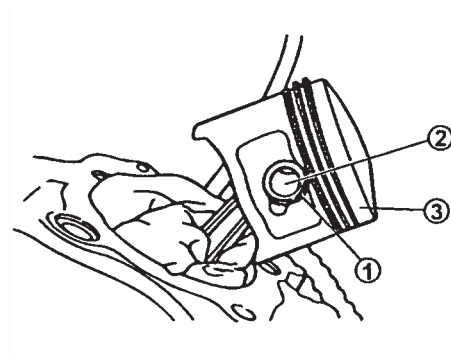
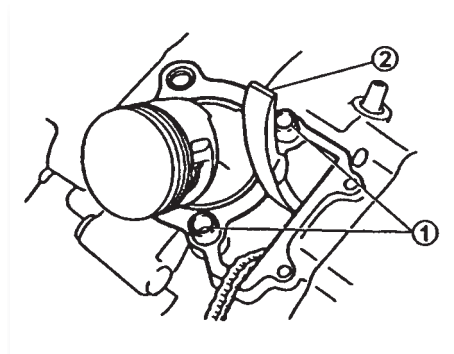


10) REMOVE:

- Tangs guide (1).
- Gasket (cylinder) (2).

11) REMOVE:

- Clamp rings of the bolt (1).
- Bolt (2).
- Piston (3).





Remark:

- Before removing the clamp rings of the bolt, cover the cylinder with a clean cloth to avoid that something falls inside the engine.
- Before removing the bolt, take the slot flanges out of the clamp rings and the orifice rim. Once the flanges are removed, if there are still difficulties for getting the bolt out, use the corresponding tool.

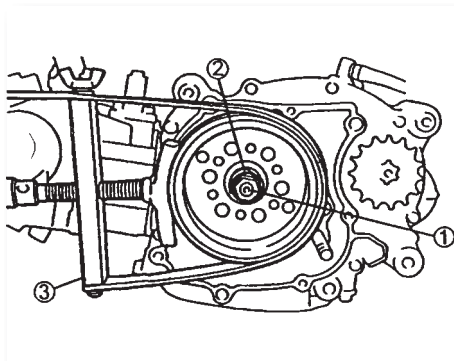
3.2 MAGNETO FLYWHEEL

Remark:

The magneto flywheel can be removed while the engine is assembled in the frame, releasing the change pedal.

1) EXTRAER:

- Chassis cowl (LS).
- Drive of the neuter switch.
- Nut (magneto) (1).
- Flat Washer(2).



Remark:

Loosen the nut of the magneto while hold the magneto with the rotor support (magneto) (3).

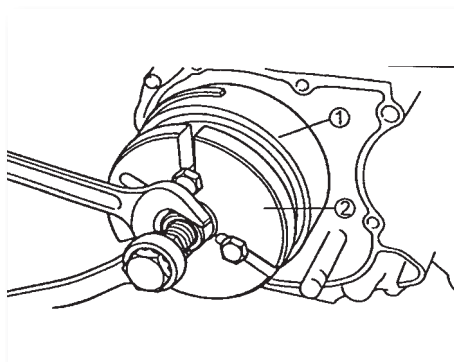
**2) REMOVE:**

- Magneto flywheel (1).
- Cotter.

Remark:

- Remove the flywheel magneto with the rotor extractor (2).

• Centre the rotor extractor of the magneto flywheel. Make sure that the play between the extractor and the flywheel is the same in all the points, after installing the securing screws. If it is necessary, loosen one of the screws lightly in order to tighten the extractor position.



Cover the point of the crankshaft with the spanner to avoid damages.

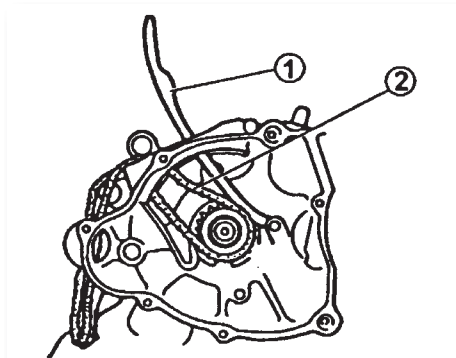
3) REMOVE:

- Start gear.
- Washer.



4) REMOVE:

- Guides of the timing chain (1).
- Timing chain (2).



3.3 CLUTCH

Remark:

The clutch unit can be removed with the assembled motor in the frame. To be able to do it take the following parts out:

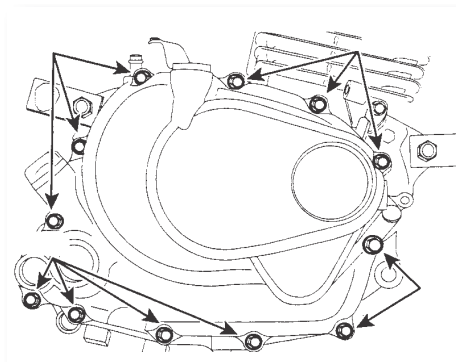
- Exhaust
- Foot rest
- Brakes pedal

1) REMOVE:

- Chassis cowlings (RS).

Remark:

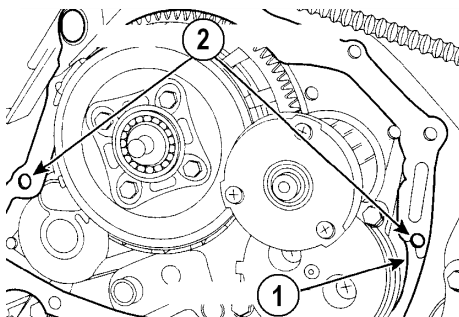
Loosen screws diagonally.





2) REMOVE:

- Gasket (1).
- Tangs guide (2).



3) EXTRAER:

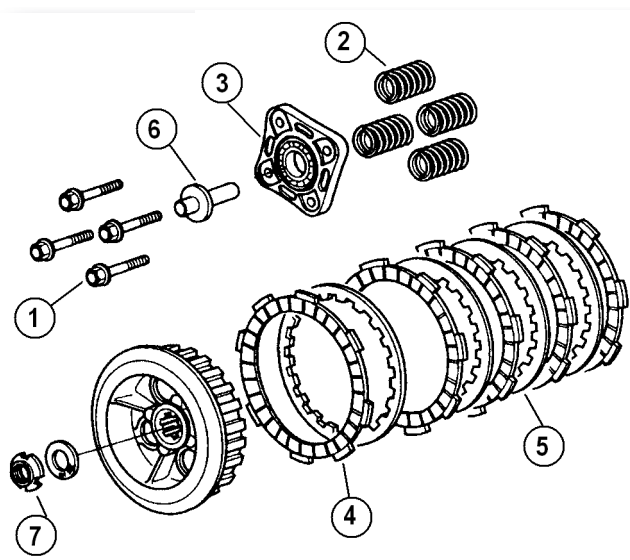
- Screws of the pressure plate (1).
- Clutch springs (2).
- Pressure plate (3).
- Friction plates (4).
- Separators (5)

Remark:

Loosen the screws of the pressure plate diagonally.

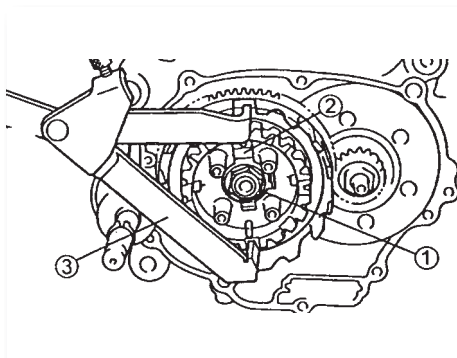
4) REMOVE:

- Operation rod N° 6.
- Ball (7).



5) LOOSE:

- Nut (clutch drum) (1).

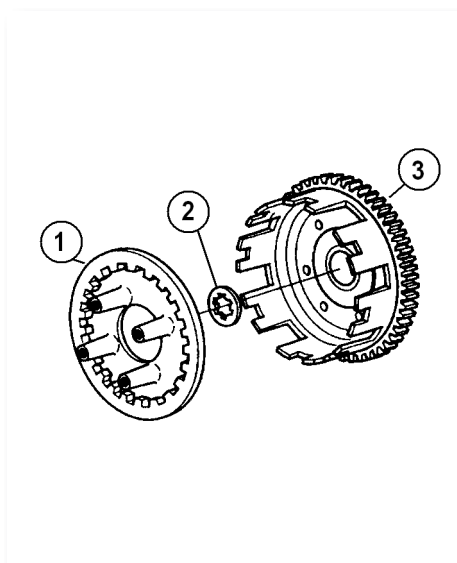


Remark:

- Smooth the rim of the clamp rings (2).
- Loosen the nut (1) from the clutch drum while the drum is hold with the universal clutch support (3).

6) REMOVE:

- Clutch drum (1).
- Pressure Washer (2).
- Clutch hood (3).



**7) LOOSE:**

- Nut (1).

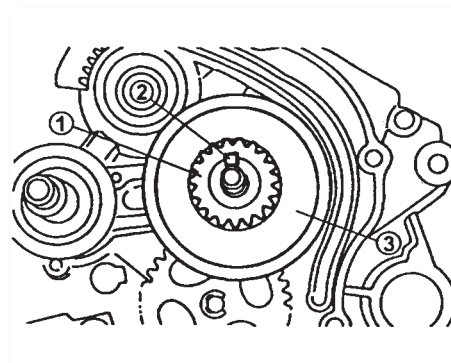
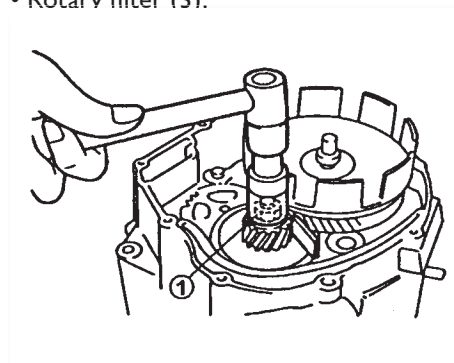
Remark:

• Place a folded aluminium sheet between the teeth of the primary gear and those of the hood.

• Take care not to damage the gear teeth.

8) REMOVE:

- Nut.
- Particular washer.
- Primary gear (1).
- Cotter (2).
- Rotary filter (3).

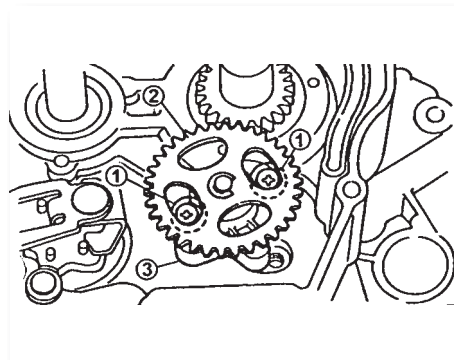
**3.4 OIL PUMP****Remark:**

• The oil pump can be removed with the assembled engine in the frame. To be able to do it take the following parts out:

- Clutch
- Rotary filter

1) REMOVE:

- Screw with washer (oil pump) (1).
- Oil pump unit (2).
- Oil impeller.

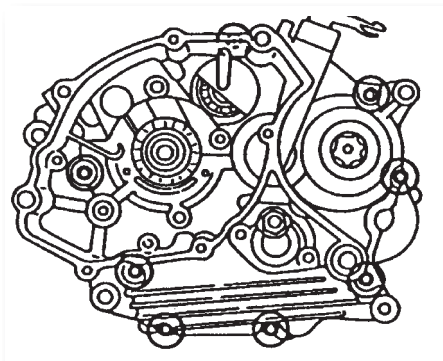
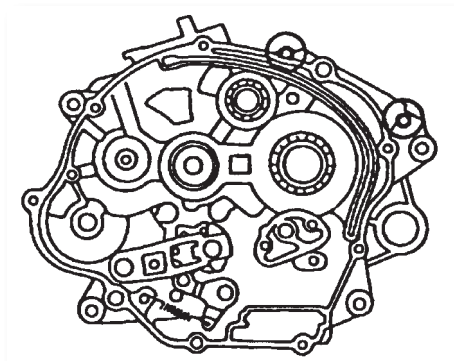




3.8 CHASSIS

1) REMOVE:

- Screws (chassis).
- Battery cable supports.



Remark:

- Loosen the screws diagonally.
- Loosen each one of the screws 1/4 turn and remove them when they are completely loose.

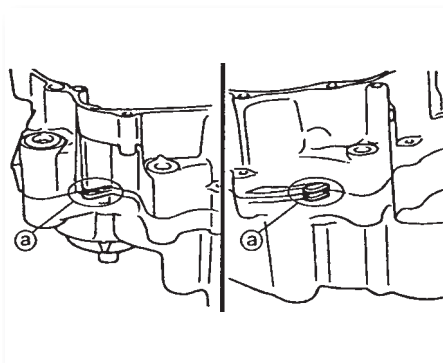
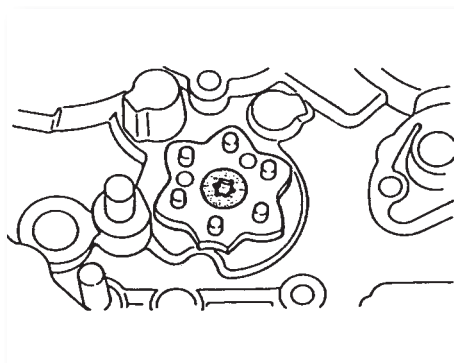
2) REMOVE:

- Screw of the change selector ring.

Use an Alien spanner of 4 mm.

3) REMOVE:

- Chassis (LD).



Remark:

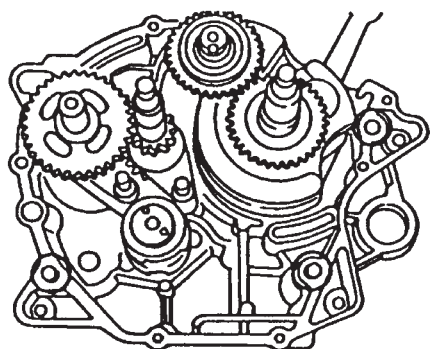
- Place the motor with the chassis (LS) downwards and then put a screwdriver in the division slots (a) of the chassis.



- Use the screwdriver only in the indicated points.
- The chassis (LS) should remain downwards.
- Separate the chassis after checking if the change selector ring and the clamp ring shaft have been removed.
- Do not damage the contact surfaces of the chassis.

3) REMOVE:

- Tangs guide.



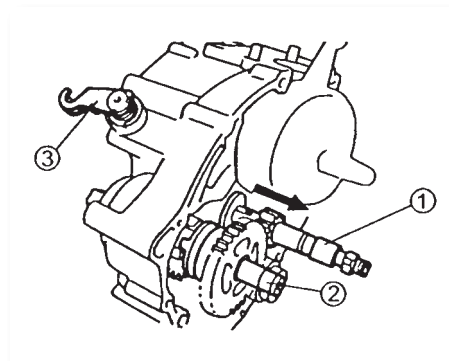
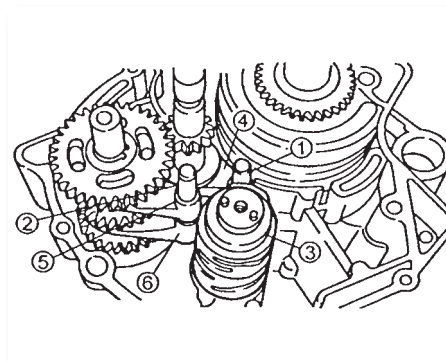
3.9 ROCKER ARM, TRANSMISSION AND CHANGE SELECTOR

1) REMOVE:

- Guide bar of the change fork (1) (short).
- Guide bar of the change fork (2) (long).
- Change selector (3).
- Change fork (1) (4).
- Change fork (2) (5).
- Change fork (3) (6).

2) REMOVE:

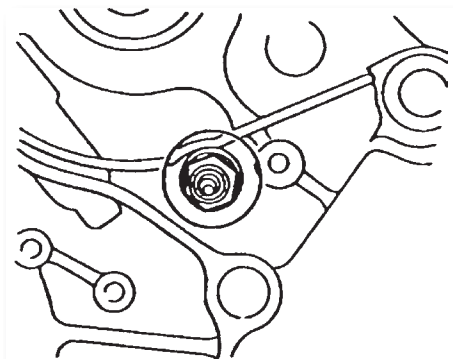
- Drive shaft unit (1).
- Operation rod (n°2).
- Driven shaft unit (2).
- Washer.
- Operation lever unit (3).





3) REMOVE:

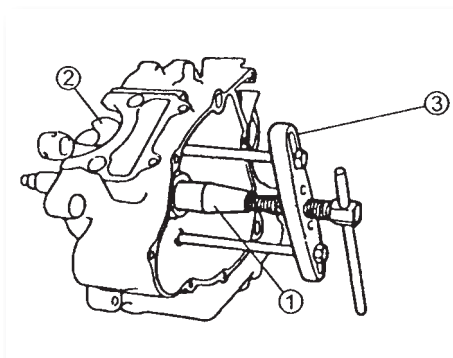
- Neuter switch.



3.10 CRANKSHAFT

1) REMOVE:

- Crankshaft (1) with the rocker arm shaft. (2).



Remark:

- Remove the crankshaft with the crankshaft extractor (1).
- Tighten the screws of the crankshaft extractor till the end, but make sure that the body of the tool is in parallel with the chassis. If it is necessary, loosen one of the screws to adjust the position of the crankshaft extractor.



3.II ROCKERS, CAMSHAFT AND VALVES

1) LOOSEN:

- Locknut of the valve adjusters.
- Valve adjusters.

2) REMOVE:

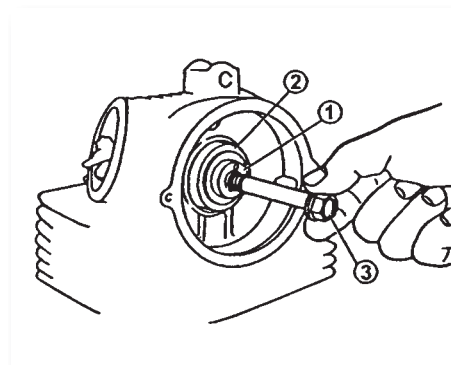
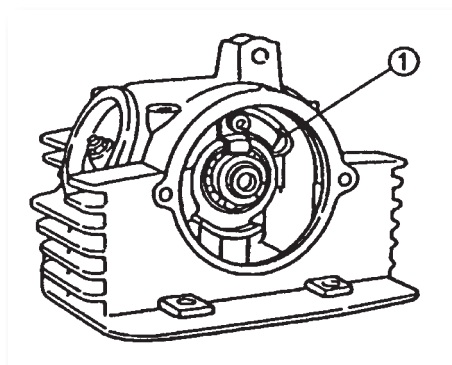
- Clamp plate (1).

3) REMOVE:

- Camshaft (1).
- Space washer (2).

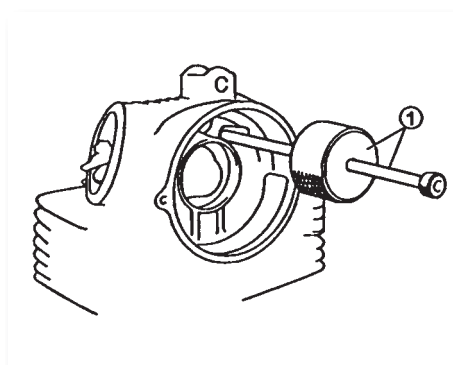
4) REMOVE:

- Rockers shafts.
- Rockers (intake and exhaust).



Remark:

- Install the special tool (1) in the rocker shaft to take it out.



Remark:

- Before removing the internal parts (valves, springs, valve seating, etc) of the cylinder head, check the valves are closed.



5) CHECK:

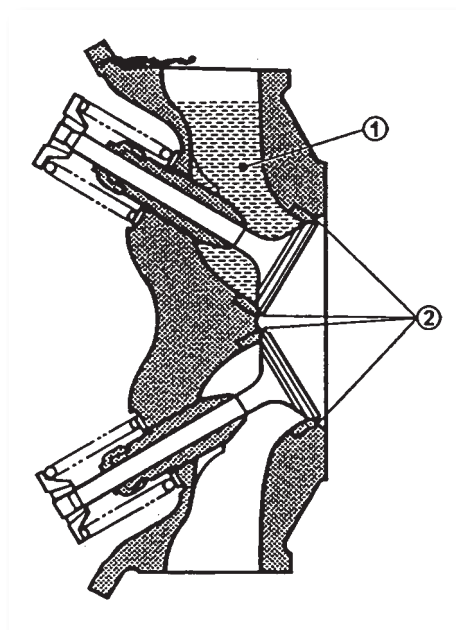
- Valve closing.

Leaks in the valve seating => **Check the valve , valve seating and width of the valve seating.**

See section: **“CHECK AND REPAIR – VALVE SEATING”**.

Steps for checking:

- Fill up the intake chamber and then the exhaust chamber with petrol (1).
- Check the closing of both valves. The valve seating (2) cannot have any leak.

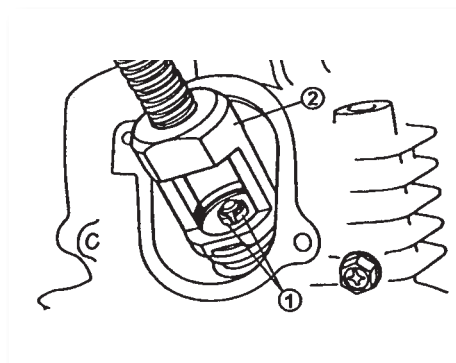


6) REMOVE:

- Valve clasp (1).

Remark:

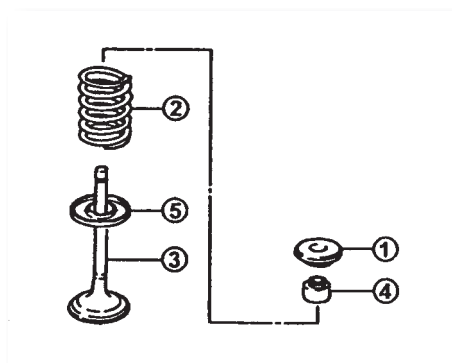
- Install the valve spring compressor (2) between the seating of the clasp and the cylinder head, to loosen the valve clasp.





7) REMOVE:

- Clasp seating (1).
- Spring (2).
- Valve (3).
- Constraint ring (4).
- Spring seating (5).



Remark:

- Identify the position of each piece carefully, so that they can be reinstalled in their original positions.

3.12 CYLINDER HEAD CHECK AND REPAIR

1) ELIMINATE:

- Carbon sediment (of the compression chamber).
- Use a rounded spatula.

Remark:

- Do not use an instrument with sharp edges to avoid damages and scratches.
- In the thread of the spark plug.
- In the valve seating.



2) CHECK:

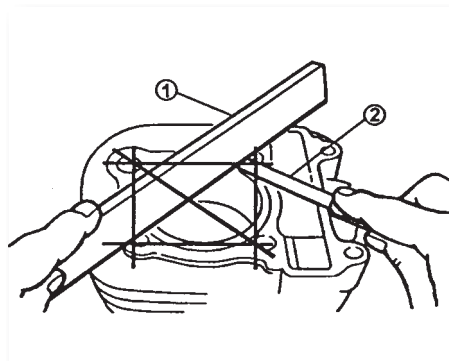
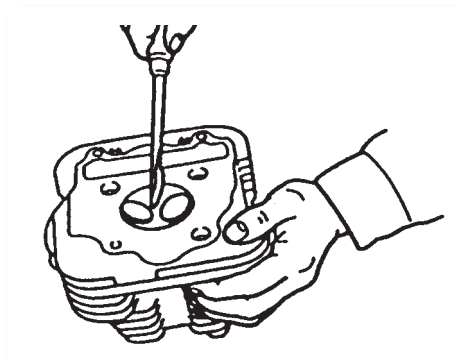
- Cylinder head.

Scratches / damages => **Replace.**

3) MEASURE:

- Strain.

Unspecified => **Rectify.**



Strain of the cylinder head:

Below 0,05 mm

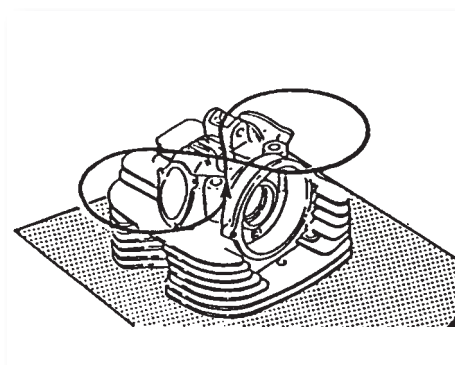
Steps for measuring the strain and correction:

- Place a rule (1) and a calibre of thickness (2) on the surface of the cylinder head as it is illustrated above.

- Measure the strain.

- If the strain is unspecified, correct the cylinder head.

- Put a sandpaper of 400 ~ 600 on a flat surface and correct the cylinder head surface with 8-shaped movements.



Remark:

- Rotate the cylinder head several times to avoid excessive removal of material only in one side.



3.13 VALVE SEATING

1) ELIMINATE:

- Carbon sediment..
(in the face and in the valve seating).

2) CHECK:

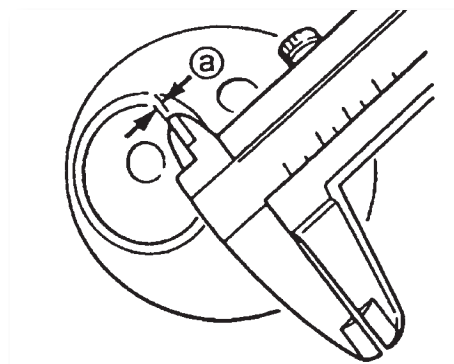
- Valve seating.

Groove / Wear => **Polish the valve with emery.**

3) MEASURE:

- Width of the valve seating (a).

Unspecified => **Polish the valve with emery.**



Width of the valve seating:

Inlet:

1,1 -1,3 mm

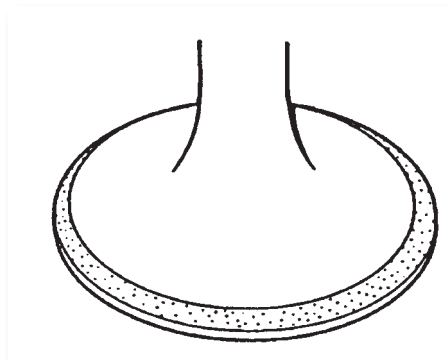
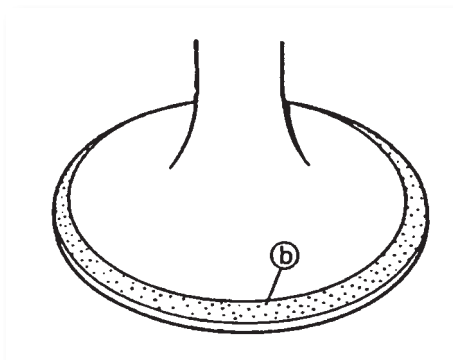
Exhaust:

1,1 -1,3 mm

<

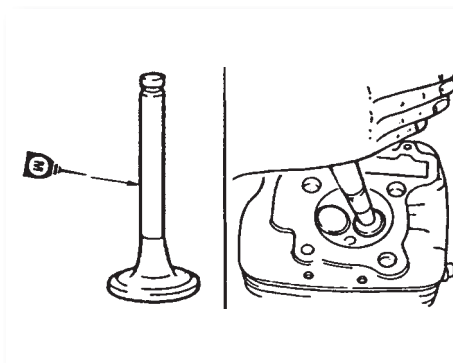
Steps for measuring:

- Apply blue ink of mechanics (Dykem) (b) in the face of the valve.
- Install the valve in the cylinder head.
- Press the valve against the guide and against its seating to make a visible mark.
- Measure the width of the valve seating.
- Where there was a contact between the seating and the front of the valve, the ink will be removed.
- If the seating width of the valve is big, small or it is not centred, it has to be redone.



4) POLISH WITH EMERY:

- Front of the valve.
- Valve seating.



Remark:

- After correcting the valve seating or replacing the valve and its guide, the seating and the front should be polished with emery.

Steps for fixing the valves:

- Apply an abrasive thickness paste on the front of the valve.



Not to allow to enter the paste in the space between the rod and the valve guide.

- Apply oil with disulphide molybdenum in the valve rod.
- Install the valve in the cylinder head.
- Rotate the valve until its front and its seating are uniformly polished, at once eliminate the whole paste.

Remark:

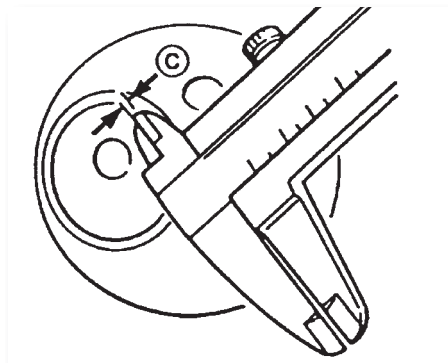
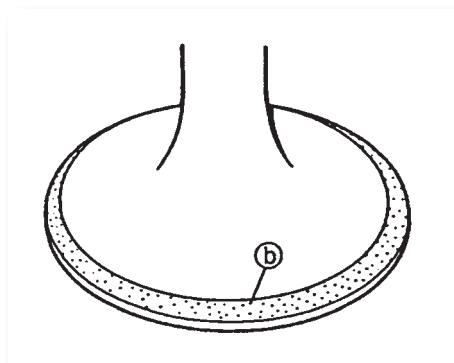
- To obtain the best results in fixing the valves, flap smoothly in the valve seating while you turn it forwards and backwards by hand.
- Apply an abrasive thin paste on the front of the valve and repeat the steps aforementioned.



Remark:

- Make sure that the front and the seating are completely free from the abrasive paste after each fixing of valves.

- Apply blue ink of mechanics (Dykem) on the front of the valve (b).
- Install the valve in the cylinder head.
- Press the valve through the valve guide and against its seating to get a good contact.
- Measure the width of the valve fixing (c) again. If it is unspecified, correct and polish the valve seating with emery.



3.14 VALVES AND VALVE SPRINGS

1) MEASURE:

- Free length(a) of the spring.
- Unspecified = > **Replace.**



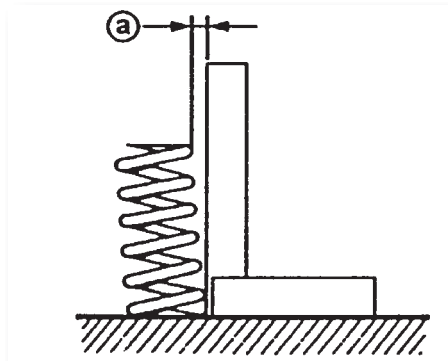
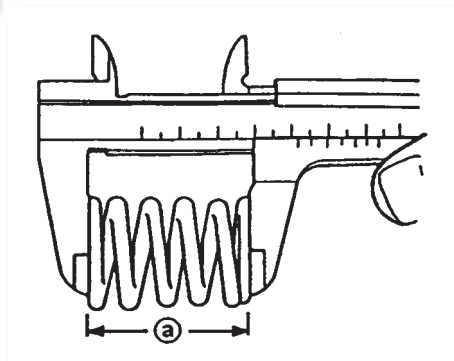
Free length of the valve spring:
44,90 mm

2) MEASURE:

- Inclination of the spring (a).
- Unspecified = > **Replace.**



Inclination limit of the spring:
1,7mm





3) MEASURE:

- Contact front of the spring.
- Wear / damages / scratches => **Replace.**

4) MEASURE:

- Internal Diameter of the valve guide.
- Unspecified => **Replace.**



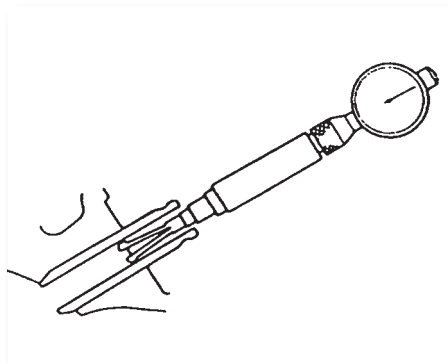
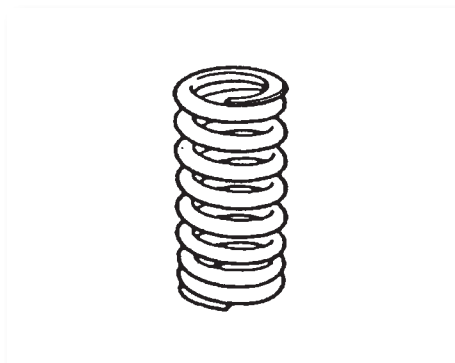
Internal diameter of the valve guide:

Inlet:

5,475 - 5,465 mm

Exhaust:

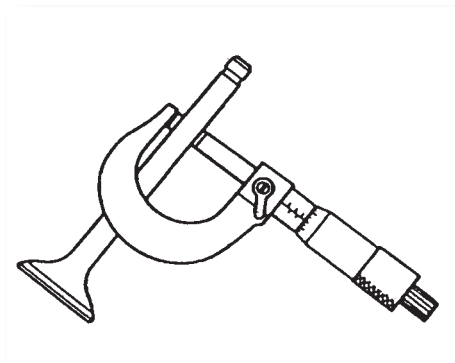
5,475 - 5,465 mm



5) MEASURE:

Rod-guide set:

- Internal diameter of the guide.
- Diameter of the rod valve.



Limit of rod-guide set:

Inlet:

0,010 ~ 0,035 mm

Exhaust:

0.030 ~ 0,055 mm

Unspecified => **Replace the valve guide.**



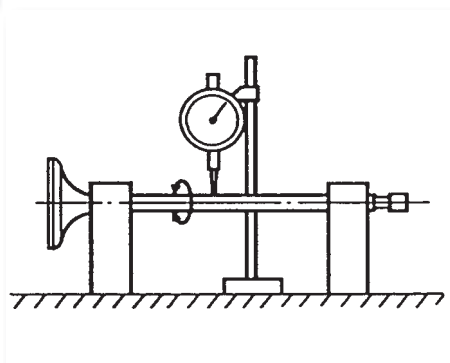
6) MEASURE:

- Warping (valve rod).
- Unspecified => **Replace.**



Warping limit:

0,01 mm



3.15 CAMSHAFT CHECKING

1) CHECK:

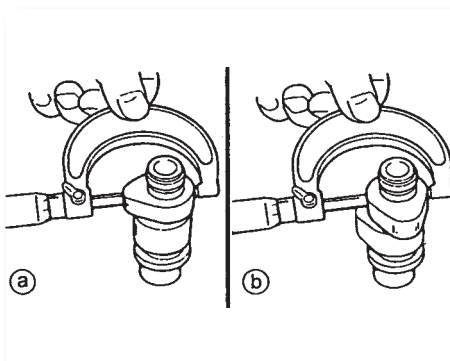
- Cam salient.

Groove / scratches / blue coloration => **Replace.**

2) MEASURE:

- Cam measurements (a) and (b).

Unspecified => **Replace.**



Cam measurements:

Inlet:

(a) 31,402 ~ 31,582 mm
< Limit: 31,10 mm >

Exhaust:

(a) 32,082 - 31,262 mm
< Limit: 30,70 mm >



3) CHECK:

- Oil leak in the camshaft.

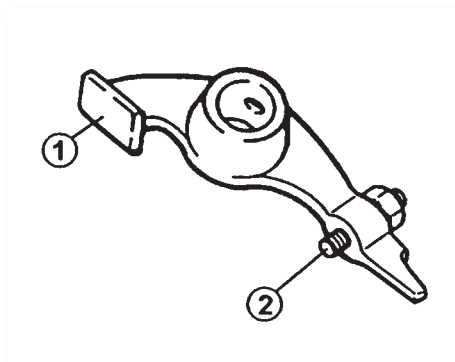
Obstruction => **Compressed air blowing.**

3.16 ROCKERS AND THEIR SHAFTS CHECKING

1) CHECK:

- Cam contact surface (1).
- Adjuster surface (2).

Wear / grooves / scratches / blue coloration => **Replace.**



Steps for checking:

- Check if the two contact areas of the rockers have signs of abnormal wear.

- Orifice of the rocker shaft.

- Cam contact surface.

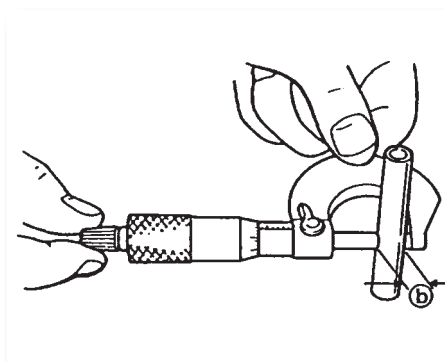
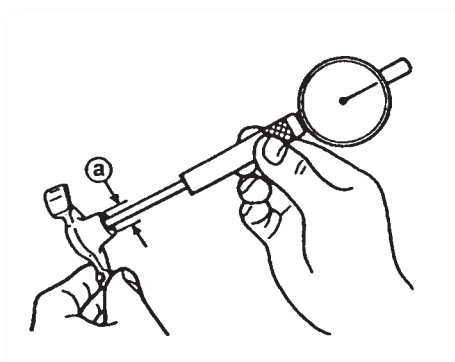
Excessive wear => **Replace.**

- Check the surface conditions of the rockers shaft.

Grooves / scratches / blue coloration => **Replace or check the lubrication system.**

- Measure the internal diameter of the rockers orifice.

Unspecified => **Replace.**





Internal diameter (rocker) :

12,000 ~ 12,018 mm

- Measure the external diameter (b) of the rockers.
- Unspecified = > **Replace.**



External diameter (rocker shaft):

11,966 ~ 11,984 mm

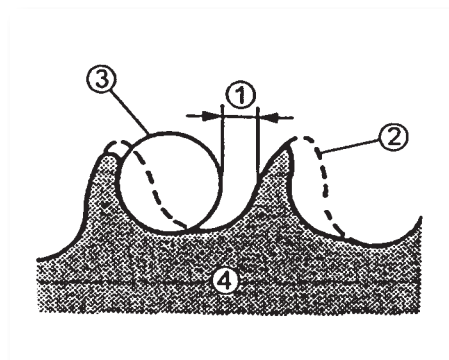
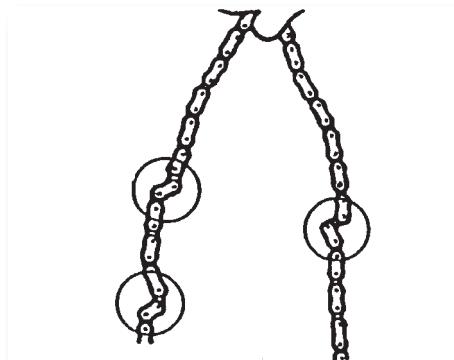
3.17 CAMSHAFT CHECKING

1) CHECK:

- Timing Chain.
- Rigidity / damages = > **Replace the chain and the gear.**

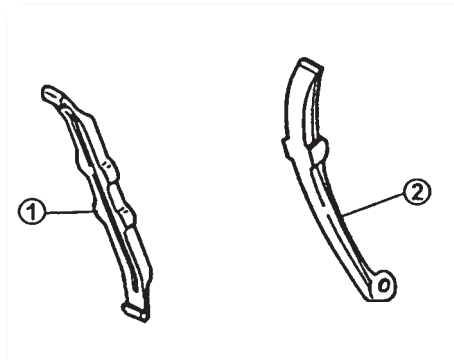
2) CHECK:

- Control gear.
- Damages / wear = > **Replace the gear and the timing chain.**
- 1/4 tooth (1).
 - Correct (2)
 - Roller (3).
 - Gear (4).



3) CHECK:

- Timing chain guides (exhaust) (1).
 - Timing chain guides (intake) (2).
- Damages / wear = > **Replace.**





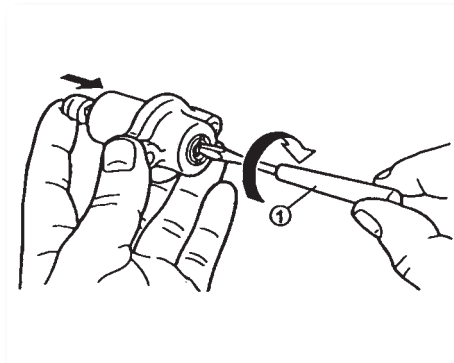
3.18 TIMING CHAIN STRUT

1) CHECK:

- Ratchet brace operation.
- Irregular operation => **Replace.**

Steps for checking:

- While the adjuster rod is lightly pressed by hand, use a screwdriver to turn totally the adjuster rod clockwise.
- When get the screwdriver out, press lightly by hand, and make sure that the adjuster rod moves forwards smoothly.
- On the contrary, replace the adjuster chain unit.



3.19 CYLINDER AND PISTON

1) CHECK:

- Cylinder and piston walls.
- Vertical scratches => **Rectify or replace the cylinder and the piston.**

2) MEASURE:

- Cylinder-piston play.

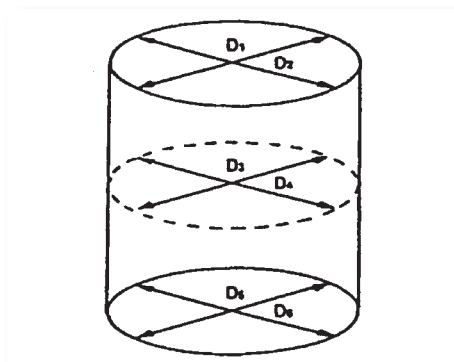
Steps for measuring:

1st Step:

- Measure the "C" diameter of the cylinder.

Remark:

- Measure the "C" diameter of the cylinder in a cross-shape and right-angled to the crankshaft. Then, calculate the average of the measurements.



Check and repairs

Engine



"c" Diameter of the cylinder	56,500 ~ 56,510mm
"T" conical limit	0,05mm
Ovalidad "R"	0,01mm

"C" = maximum D
"T" = (maximum D ₁ or D ₂) - (maximum D ₅ or D ₆)
"R" = (maximum D ₁ , or D ₃ or D ₅) - (maximum D ₂ , or D ₄ or D ₆)

- If it is unspecified, rectify or replace the cylinder and replace the piston and the rings altogether.

2nd Step:

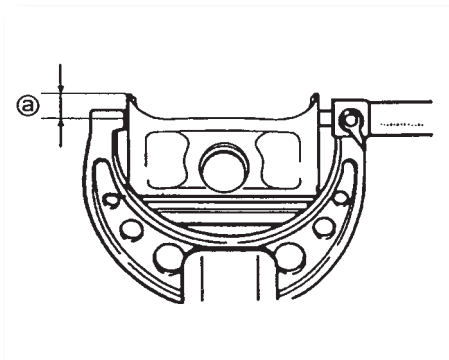
- Measure the "brim" of the "P" piston with a micrometer.

(a) 4,5 mm from "brim" of the piston.

	"P" Piston diameter
Standard	56,470 ~ 56,490 mm

Over measure	I°
	II°

- It is unspecified, replace the piston and the rings altogether.



3rd Step:

- Calculate the cylinder – piston play, using the following formula:

Cylinder – piston set:

Diameter of the "C" cylinder.

Diameter of the "P" piston brim.



Set (cylinder - piston):

0,01 - 0,04 mm

< Limit >: 0,15 mm

- If it is unspecified, rectify or replace the cylinder, the piston and its rings altogether.



3.20 RINGS CHECKING

1) MEASURE:

- Lateral play.

Unspecified = > **Replace the piston and its rings altogether.**

Remark:

- *Eliminate the carbon sediments from the grooves of the piston rings before measuring the lateral play.*



Lateral play (rings of the piston):

Top ring - Limit

0,5 mm

Secondary ring (scraper):

< Limit >

0,5 mm

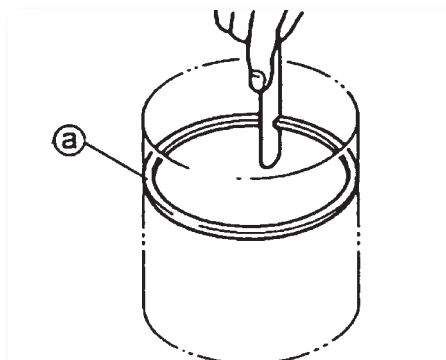
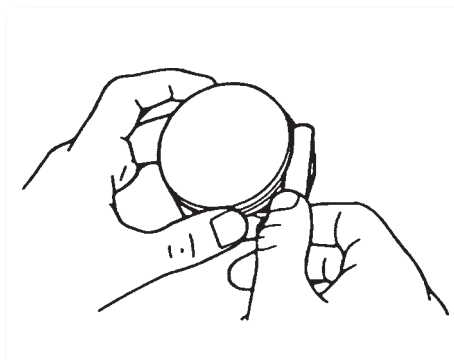
2) PLACE:

- Piston rings (in the cylinder).

Remark:

- *Push the ring with the piston top, in order that it is in parallel with the cylinder base.*

(a) 5 mm



3) MEASURE:

- Play among tips

Unspecified = > Replace.

Remark:

- *You cannot measure the play among tips in the extension ring of the oil ring. If the oil ring has a excessive play, replace the three rings.*



Play among tips:

Top ring - Limit:

0,10 - 0,25 mm <0,5 mm>

Secondary ring (scraper) - Limit:

0,20 ~ 0,35 mm <0,5 mm>

Oil ring:

0,20 ~ 0,70 mm <0,9 mm>



3.21 BOLT CHECKING

1) CHECK:

- Bolt.

Blue coloration / grooves => Replace and immediately control the lubrication system.

2) MEASURE:

- Play piston - bolt.

Steps for measuring:

- Measure the external diameter of the bolt (a).

Unspecified => Replace the bolt.



External diameter (bolt):

< Limit: 14,96 mm >

- Measure the diameter of the bolt place in the piston (b).
- Calculate the piston – bolt play, using the following formula:

Piston – bolt play:

Internal diameter (bolt place) (b).

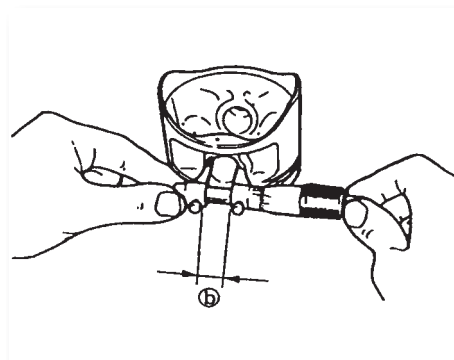
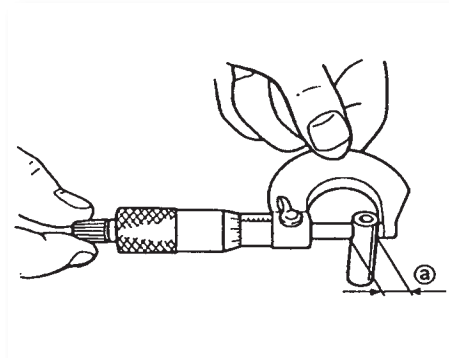
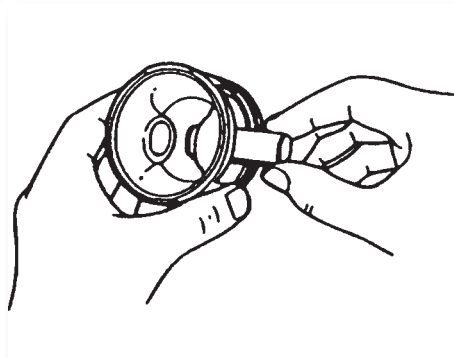
External diameter (bolt) (a).

- If it is unspecified, replace the piston.



Play (piston - bolt):

0,002 - 0,014 mm <Limit: 0,07 mm>



3.22 CRANKSHAFT

1) MEASURE:

- Non-alignment crankshaft.

Unspecified => **Replace the crankshaft and/or ball bearings.**

Remark:

- Measure the non-alignment crankshaft Rotate the crankshaft unit slowly.



Non-alignment limit:

0,10 mm

2) MEASURE:

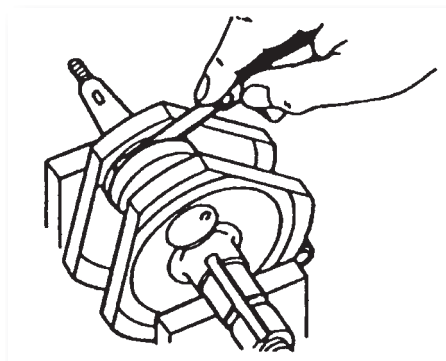
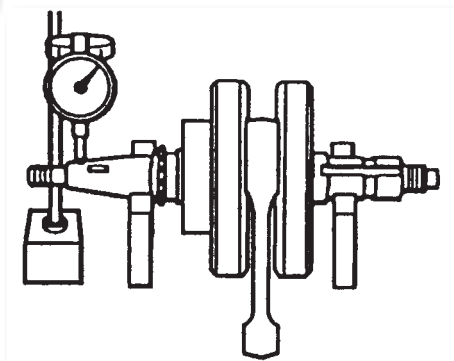
- Lateral play of the connecting rod.

Unspecified => **Replace the connecting rod ball bearing, the crankshaft elbow and/or the connecting rod.**



Lateral play of the connecting rod:

0,05 - 0,30 mm



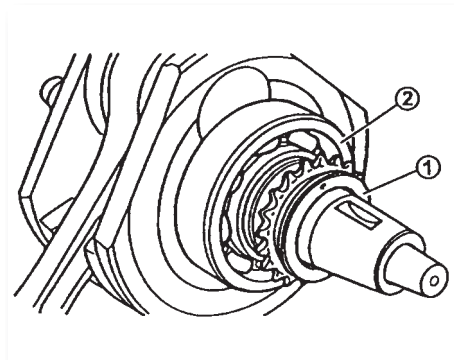
3) CHECK:

- Crankshaft gear (1).

Damages / wear => **Replace the crankshaft.**

- Ball bearing (2).

Wear / fissures / damages => **Replace the crankshaft.**

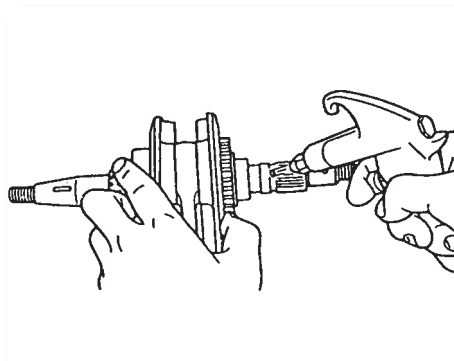




4) CONTROL:

- Oil leak in the crankshaft.

Obstruction => **Compressed air blowing.**



3.23 ROCKER ARM CHECKING

1) CHECK:

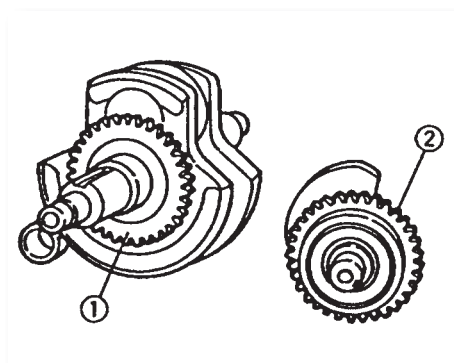
- Teeth of the rocker arm drive gear (1).
- Teeth of the rocker arm driven gear (2).

Wear / damages => **Replace the unit.**

2) CHECK:

- Rocker arm shaft.

Wear / crack / damages => **Replace.**





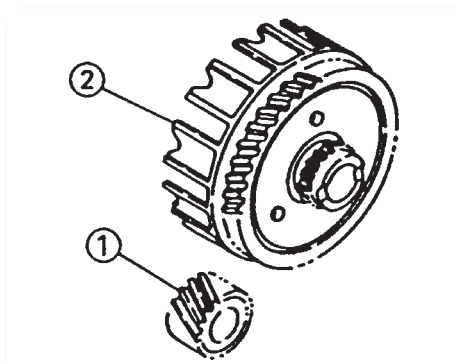
3.24 CLUTCH HOOD CHECKING

1) CHECK:

- Teeth of the primary gear (1).
- Teeth of the hood gear (2).

Wear / damages => **Replace both gears.**

Excessive noise during the operation => **Replace both gears.**



3.25 CLUTCH CHECKING

1) CHECK:

- Friction plates.

Wear / damages => **Replace the friction plates unit.**

2) MEASURE:

- Thickness of the friction plates.

Unspecified => **Replace the friction plates unit.**

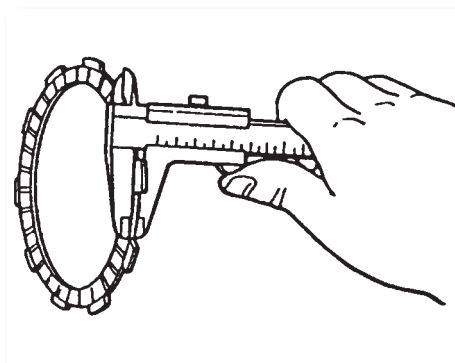
Measure in 4 different positions.



Thickness (friction plates):

3,0 mm

< Limit: 2,7 mm >



**3) CHECK:**

- Separators.

Damages = > **Replace the separators unit.**

4) MEASURE:

- Separators strain.

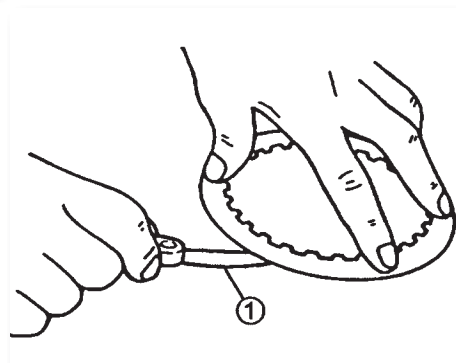
Unspecified = > **Replace the separators unit.**

Take the measurements on a plane table with the help of a thickness calibre (1).

**Strain limit**

(separators):

Lower than 0,05 mm

**5) CHECK:**

- Clutch springs.

Damages = > **Replace the springs units.**

6) MEASURE:

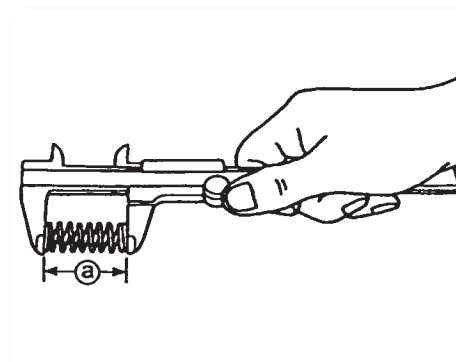
- Free length (springs) (a).

Unspecified => **Replace the springs unit.**

**Free length (springs):**

34,6 mm

< Limit: 32,5 mm >





7) CHECK:

- Nails (of the hood) (1).

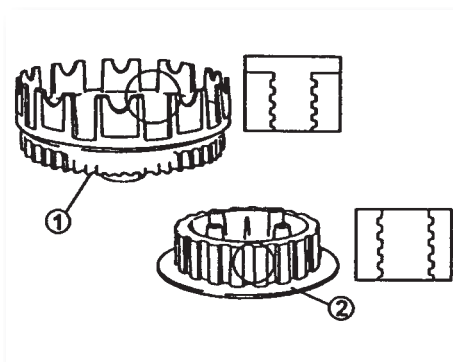
Rims / wear / damages => **Eliminate the rims or replace the hood.**

- Grooves in the clutch drum (2).

Rims / wear / damages => **Replace the clutch drum.**

Remarks:

- Rims in the nails of the hood and in the grooves of the clutch drum results in an irregular operation.

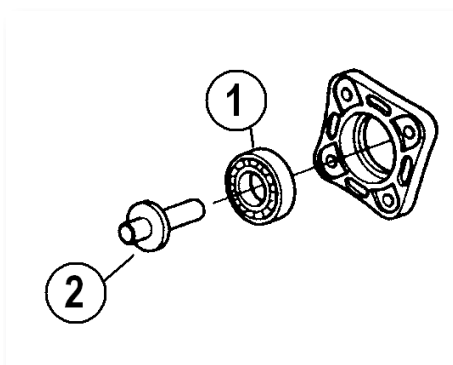


3.26 ROD OPERATION CHECKING

1) CHECK:

- Ball bearing (1).
- Rod operation (2).

Wear / cracks / damages => **Replace.**





3.27 FORKS AND CHANGE SELECTOR CHECKING

1) CHECK:

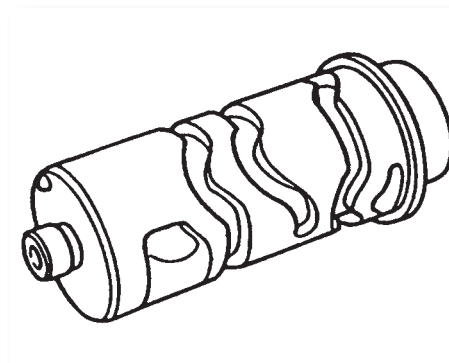
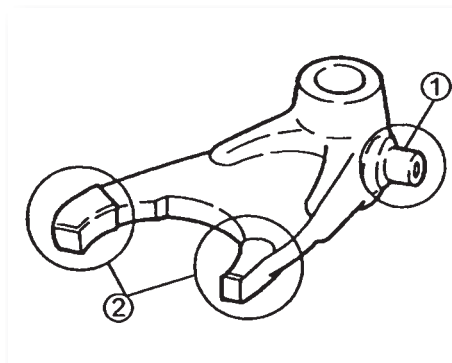
- Fork extension (1).
- Extremities of the change forks (2).

Scratches / warping / wear / damages => **Replace.**

2) CHECK:

- Grooves in the change selector.
- Wear / damages / scratches => **Replace.**
- Extension of the change selector.

Wear / damages => **Replace.**



CHECK:

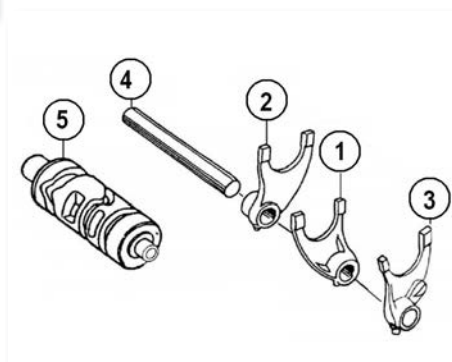
- Change fork 1 centre (1).
- Change fork 2 in the top (2).
- Change fork 3 in the bottom (3).
- Guide bar (4).
- Change selector (5).

Roll the guide bar on a flat surface.

Warping => **Replace.**



Do not try to straighten up a warping guide bar.





4) CHECK:

- Movement of the change forks (in the guide bar).

Irregular movement => **Replace the fork and the bar.**

Remark:

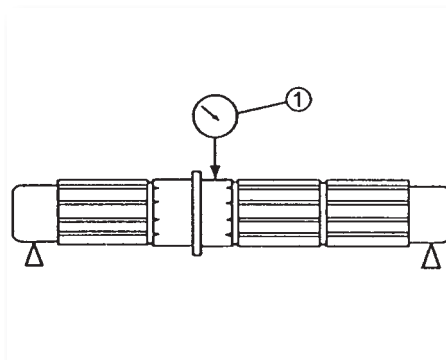
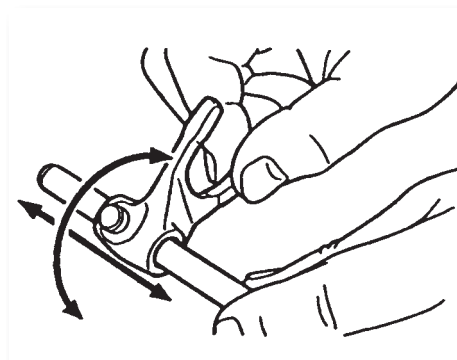
- If the change fork and the transmission gear are damaged, replace the gears which are side by side of the unit.

5) MEASURE:

- Warping of the Shafts (driver and driven one).

Use a tip support and a clock to compare (1).

Unspecified => **Replace the warped shaft.**



6) CHECK:

- Teeth of the gears.

Blue coloration / grooves / wear => **Replace.**

- Nails of the gears.

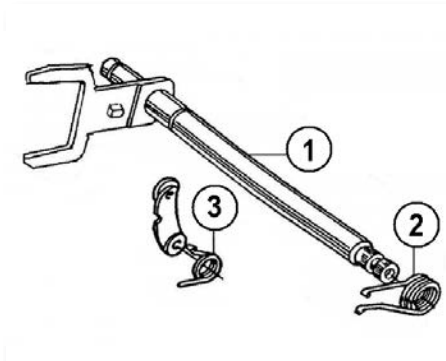
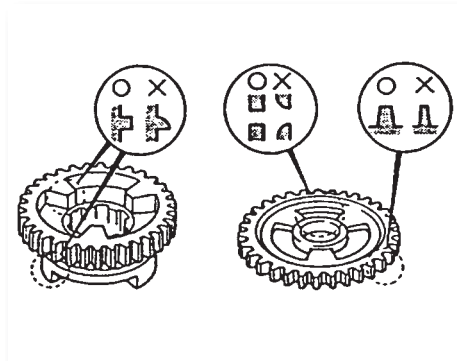
Rounded brim / cracks / missing parts => **Replace.**

7) CHECK:

- Change shaft (1).

Damages / warping / wear => **Replace.**

- Spring of return (change shaft) (2).
- Spring of return (constrained rod) (3).
- Wear / damages => **Replace.**

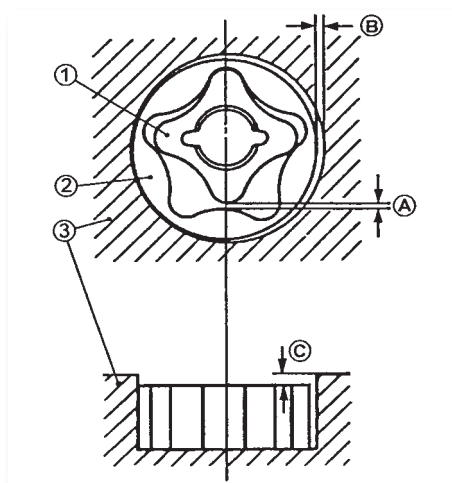




3.29 OIL PUMP CHECKING

1) MEASURE:

- Play among tips (TO).
(between internal rotor (1) and external rotor (2)).
- Lateral play (B).
(between external rotor (2) and the pump casing (3)).
- Unspecified => **Replace the oil pump unit.**
- Play between the casing and the rotor (C).
(between the pump casing (3) and the rotors (1) and (2)).
- Unspecified => **Replace the pump oil unit.**



Play among tips (A):

0,15 mm <Limit: 0,20 mm>

Lateral play (B):

0,15 ~ 0,21 mm <Limit: 0,35 mm>

Play between the casing and the rotor (C):

0,03 ~ 0,12 mm <Limit: 0,15 mm>

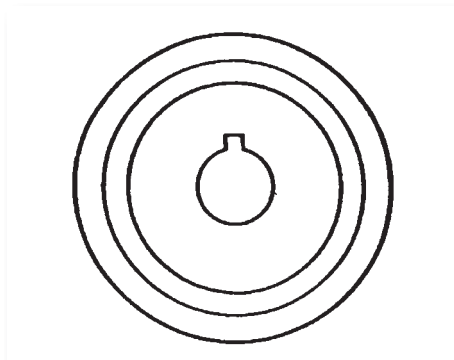


2) CHECK:

- Rotary filter.

Cracks / damages => **Replace.**

Contamination => **Clean.**

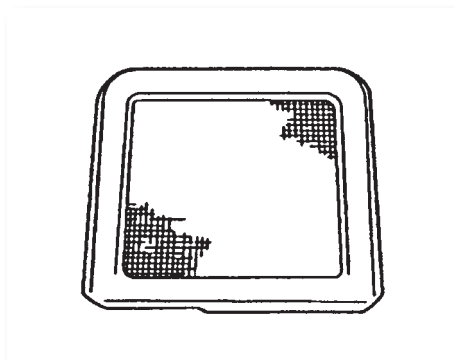


3) CHECK:

- Oil impeller.

Cracks / damages => **Replace.**

Contamination => **Clean.**



3.30 OIL LEAKS CHECKING (COVER OF THE CASSING IN THE RIGHT SIDE)

1) CHECK:

- Oil leak.

Obstruction => **Blow with compressed air.**



3.31 CHASSIS

- 1) Wash the chassis properly with kerosene.
- 2) Clean the surfaces which bear the gaskets and the surfaces in contact with the chassis properly.

1) CHECK:

- Chassis.

Cracks / damages = > **Replace.**

- Oil leaks.

Obstruction = > **Blow the leaks with compressed air.**

3.32 CLAMP RINGS AND WASHERS

1) CHECK:

- Clamp rings.
- Washers.

Damages / loose / deformed = > **Replace.**



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